ENCODERS

Bulletin 101

SINGLE CHANNEL

Audio Tone Encoding

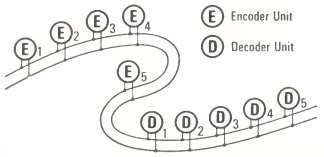
ENCODER COMPONENTS AND SYSTEMS TO COMMAND, SELECT, INDICATE, AND REGULATE

LEDEX

BRAMCO CONTROLS DIVISION, LEDEX INC., PIQUA, OHIO

audio tone encoding

An audio tone can be generated by an electronic oscillator or resonant reed encoder circuit, then transmitted by wire or radio. The tone activates a resonant reed relay to perform a control function that selects, indicates, or regulates.



A single pair of wires, or a leased telephone line, can carry the audio signals for a complete control system.

For inaccessible areas or mobile installations, a radio transmitter and receiver system can carry the signals.

Bramco* resonant reed encoders are precision electromechanical devices designed for use as the frequency determining components in audio oscillator circuits.

Accurately tuned and processed, the reed is free to vibrate as a single tine of a tuning fork. It is biased by an alnico permanent magnet. As it vibrates, the reed motion induces an impedance change in the coil at the tuned frequency. This impedance change regulates the frequency of the oscillator circuit.

Bramco encoder reeds are engineered for high accuracy. This feature, combined with the narrow response bandwidth of Bramco decoder reeds, permits over 50 selective control frequencies within the 67 to 1600 cps spectrum.

A big advantage of reeds in control switching is that they are ideally suited for simultaneous and sequential coded tone systems. The actual number of control functions possible in such a system is virtually unlimited. For example, over 3300 individual control functions are possible with only 16 frequencies coded sequentially in groups of three.

Bramco resonant reed encoders, compared to other types of audio tone oscillators, offer these main benefits: frequency accuracy, temperature and voltage stability, and simplified frequency changing in the field.

RE1: The RE1, with a broad frequency spectrum of 300 to 1600 cps, is a universal single channel encoder for any remote control system that must deliver reliable performance under tough operating conditions. A floating type internal shock mount assures high stability under mobile conditions—makes it ideal for two way selective call systems in mobile communications and industrial supervisory controls.

RE10: Comparable to the RE1 in construction and performance, the RE10 extends the frequency spectrum to the lower 67 to 300 cps range. If you're concerned about command signals interfering with normal voice communications, a sub-audible selective call system designed around the RE10's low frequency spectrum provides an ideal solution.

ME1C: Plug it in. Add power. This compact encoder module is ready to go to work as delivered. One (or several) ME1C modules comprise the entire encoding portion of your control system.

The transistorized ME1C plug-in encoder is a complete oscillator circuit with a built-in resonant reed stabilizer. Requiring only a DC voltage input, it provides a continuous running fixed audio sine wave output. The output is keyed to give immediate response when a signal is desired.

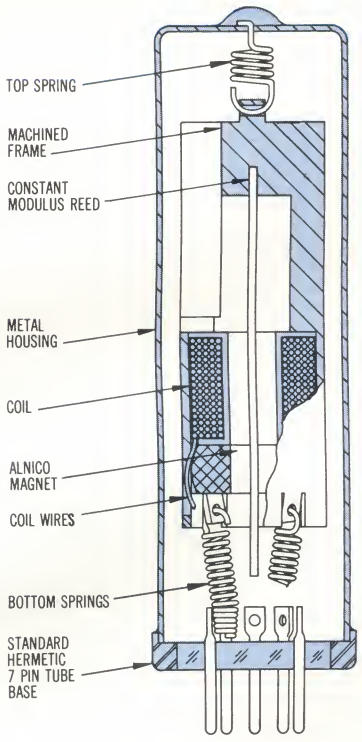
The single channel modular concept offers flexibility, allowing the addition of as many frequencies as required for a particular system. Each module, when individually keyed, provides one control function. For multiple control functions, more than 50 separate frequencies within the 67 to 1600 cps range can be provided for use in one system.

The all-transistorized circuitry is mounted on a rugged glass-epoxy printed circuit board. An internal adjustment control allows the output level to be set from 0 to maximum. The frequency of each module can be conveniently changed by replacing the plug-in resonant reed stabilizer.

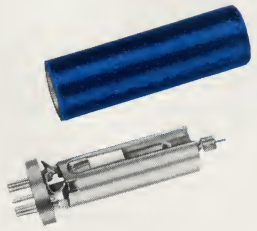
A complete high stability oscillator network, the ME1C serves as an economical and dependable encoder for any of Bramco's resonant reed decoder products.

Companion decoder modules and plug-in power supplies are also available.

RE1



*T.M. Reg. U. S. Pat. Off.



RE1
resonant reed oscillator stabilizer

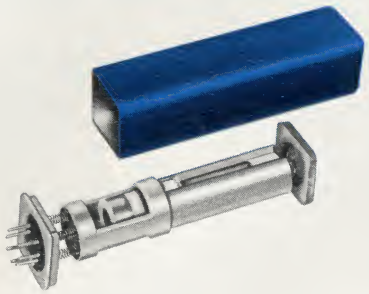
standard specifications	
frequency range	300 to 1600 cps
frequency tolerance	±.1%*
frequency stability	varies less than .002% per °C (25°C REF.)
temperature range	−40°C to +85°C
coil resistance	600 ohms dc ±10%
output impedance	depends on circuit used
output	sine wave: amplitude and frequency d
harmonic distortion	depends on circuit used
power required	. . . . .

*STANDARD ENCODERS are tuned to provide the s

AUDIO TONE CONTROL SYSTEM
USING RE1 OR RE10 ENCODERS

E = encoders, 5 frequencies
T = transmission line: RF carrier or 2 wire loop
D = decoders, 5 frequencies
F = controlled functions

NOTE: Function 4 illustrates the use of two simultaneous or sequential tones to code a single function.

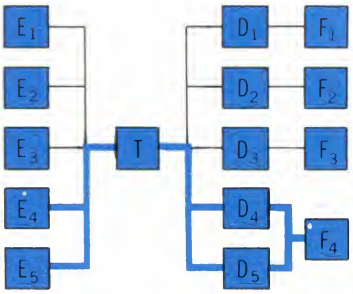


RE10
resonant reed oscillator stabilizer

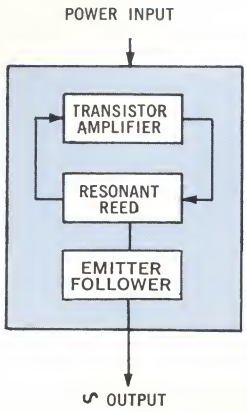
ME1C
resonant reed encoder module

RE10 resonant reed oscillator stabilizer	ME1C resonant reed encoder module
67 to 300 cps	67 to 1600 cps
±.1% or ±.1 cps (whichever is greater)*	±.15%
varies less than .002% per °C (25°C REF.)	varies less than .002% per °C (25°C REF.)
−40°C to +85°C	−40°C to +85°C
600 ohms dc ±10%	. . . . .
depends on circuit used	600 ohms
epending on circuit used	Sine wave adjustable to 2 VRMS into 600 ohms minimum
depends on circuit used	less than 5%
. . . . .	18 ma at 12 or 24 vdc

specified frequency in the encoder circuits shown (Fig. D).



ME1C FUNCTIONAL BLOCK DIAGRAM



dimensional data

base diagrams

FIG. A

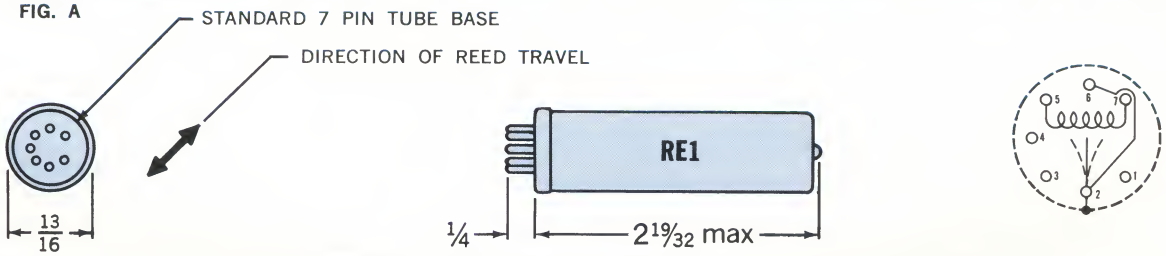


FIG. B

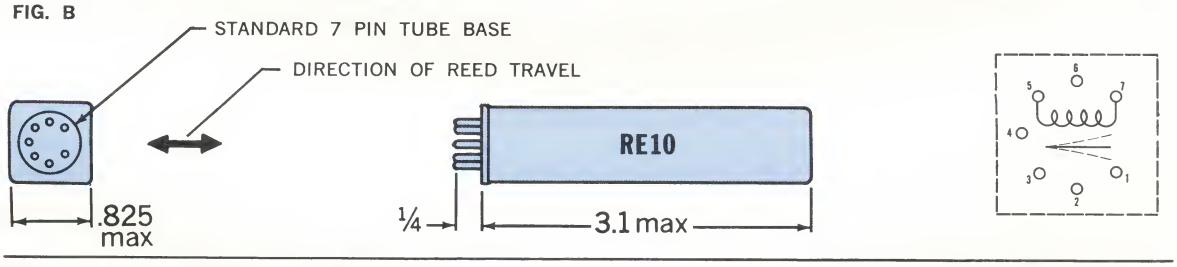
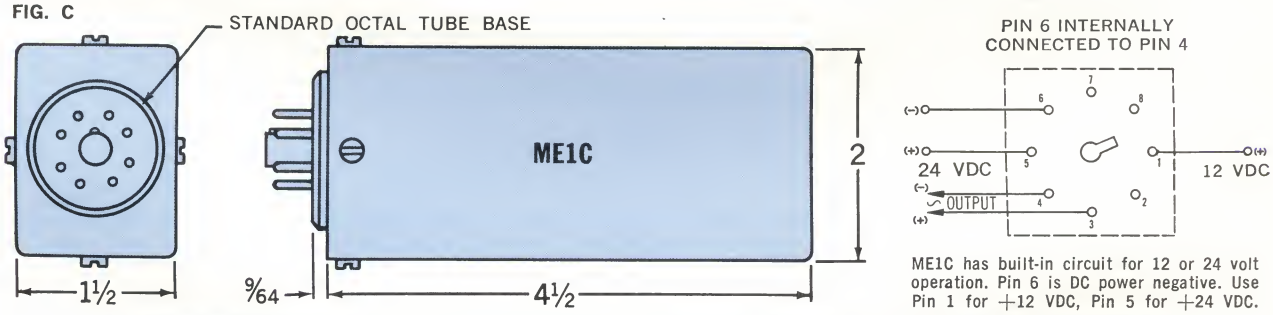


FIG. C



ME1C has built-in circuit for 12 or 24 volt operation. Pin 6 is DC power negative. Use Pin 1 for +12 VDC, Pin 5 for +24 VDC.

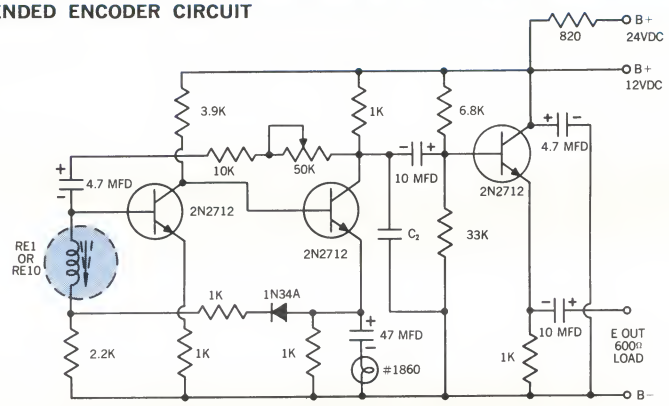
recommended encoder circuitry

Standard RE1 and RE10 encoders are tuned to provide the specified frequency in the encoder circuit (Figure D). The feedback adjustment in the oscillator circuit is provided to set the circuit gain slightly above the oscillator threshold. While not a critical adjustment, excessive feedback will result in output distortion.

Buildup time will vary from .1 to 60 seconds, depending upon frequency and feedback setting. This delay time should be considered when designing your system. The circuit will not free-run when the reed unit is disconnected.

It is recommended that the oscillator run continuously and be keyed to the amplifier to give immediate response when a signal is desired.

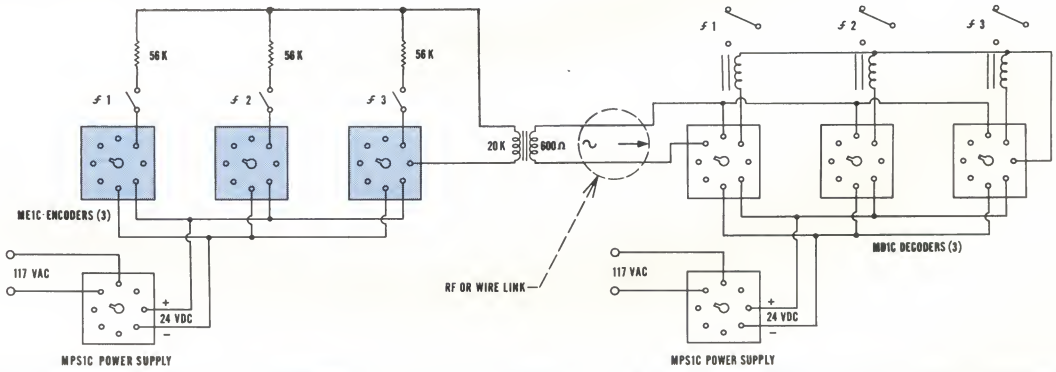
FIG. D. RECOMMENDED ENCODER CIRCUIT



C_2 VALUES

67-150 cps	.3 mfd
150-800 cps	.25 mfd
800-1600 cps	.1 mfd

FIG. E. TYPICAL ENCODER-DECODER MODULE WIRING DIAGRAM



specializing in remote controls...

Bramco engineers specialize in remote controls through single and multi-channel frequency sensing encoder/decoder components and modular systems. We welcome the opportunity to share our specialized skills with you. For application assistance, contact the factory or your nearest representative: ▶

BRAMCO CONTROLS DIVISION, LEDEX INC.

College and South Streets, Piqua, Ohio 45356 • Phone 513-773-8271

DECODERS

Bulletin 202

SINGLE CHANNEL

Audio Tone Decoding

DECODER COMPONENTS AND SYSTEMS TO CONTROL, SELECT, INDICATE, AND REGULATE

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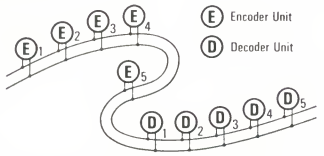
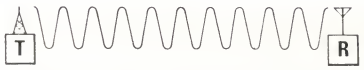
An audio tone can be generated by an electronic oscillator or resonant reed encoder circuit, then transmitted by wire or radio. The tone activates a resonant reed relay to perform a control function that selects, indicates, or regulates.



A single pair of wires, or a leased telephone line, can carry the audio signals for a complete control system.



For inaccessible areas or mobile installations, a radio transmitter and receiver system can carry the signals.

Bramco* resonant reed decoders are precision electromechanical devices that are used as frequency selective filters.

Heart of the decoder is an accurately tuned and processed reed which vibrates as a single tine of a tuning fork. The reed, which is biased by a permanent magnet, has normally open relay contacts. When a predetermined AC signal is introduced, the magnetic field fluctuates, causing the reed to vibrate and the contacts to close intermittently. This provides a switching function. If the load is higher than the reed contact rating, an auxiliary circuit can be used.

Bramco decoder reeds are engineered for narrow response bandwidth. This feature, combined with the high accuracy of Bramco encoder reeds, permits over 50 selective control frequencies within the 67 to 1600 cps spectrum.

A big advantage of reeds in control switching is that they are ideally suited for simultaneous and sequential coded tone systems. The actual number of control functions possible in such a system is virtually unlimited. For example, over 3300 individual control functions are possible with only 16 frequencies coded sequentially in groups of three.

Bramco resonant reed decoders, compared to other types of tone filters, are small and inexpensive. They give more control functions per spectrum, per size, per dollar—often pay for themselves by the wire they save.

*T.M. Reg. U. S. Pat. Off.

RD1: The RD1, with a broad frequency spectrum of 300 to 1600 cps, is a universal single channel decoder for any remote control system that must deliver reliable performance under tough operating conditions. A floating type internal shock mount assures high stability under mobile conditions—makes it ideal for two way selective call systems in mobile communications and industrial supervisory controls.

RD10: Comparable to the RD1 in construction and performance, the RD10 extends the frequency spectrum to the lower 67 to 300 cps range. If you're concerned about command signals interfering with normal voice communications, a sub-audible selective call system designed around the RD10's low frequency spectrum provides an ideal solution.

MD1C: To decode, plug it in. Add power. This compact module is ready to perform your complete decoding function. It contains an all-transistorized single stage amplifier, a high stability resonant reed relay, and a secondary transistor switching circuit.

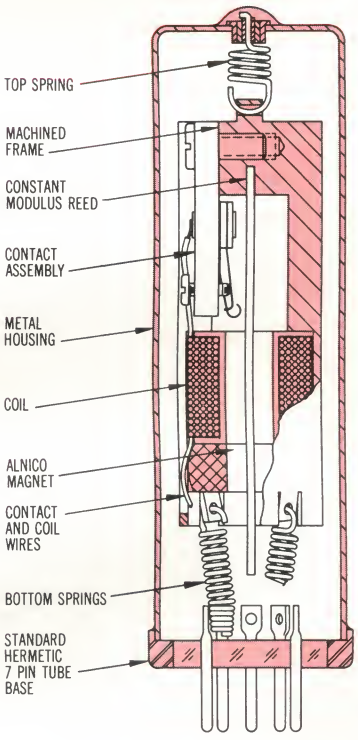
The decoder module is a narrow band audio frequency detector. Its response characteristics are controlled by a frequency sensitive resonant reed relay. When an audio signal of the proper frequency is introduced, the reed resonates at its tuned frequency causing an intermittent contact closure once each cycle. The contact closure triggers the transistor switching circuit which provides a continuous output control function.

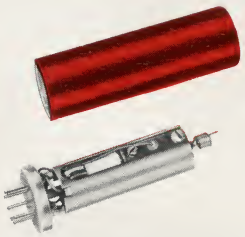
The single channel modular concept offers flexibility, allowing the addition of as many frequencies as required for a particular system.

The complete circuitry is mounted on a rugged glass epoxy printed circuit board. The frequency determining resonant reed relay is a plug-in component —making it easy to change the frequency of the module if desired.

Special relays can be supplied to provide varied response characteristics to customer requirements. Companion encoder modules and plug-in power supplies are also available.

RD1





RD1
frequency sensing resonant reed relay

standard specifications	
frequency range	300 to 1600 cps
frequency stability	varies less than .002% per °C (25°C REF.)
temperature range	−40°C to +85°C
bandwidth	±.25% minimum, ±1.5% maximum*
operating voltage level	6 VRMS
coil resistance	600 ohms dc ±10%
input impedance	. . . . .
sensitivity	.75 VRMS max., 2.0 VRMS min.*
contact duty cycle	10% min. at resonant freq., 6 VRMS
contact rating	100 ma peak at 12 vdc resistive load
power required	. . . . .

*SPECIAL RELAYS can be supplied with varying bandwidths and sen

AUDIO TONE CONTROL SYSTEM
USING RD1 OR RD10 DECODERS

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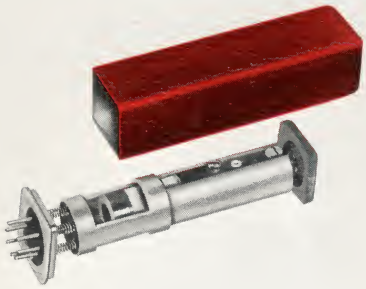
D = decoders, 5 frequencies
F = controlled functions

NOTE: Function 4 illustrates the use of two simultaneous or sequential tones to code a single function.

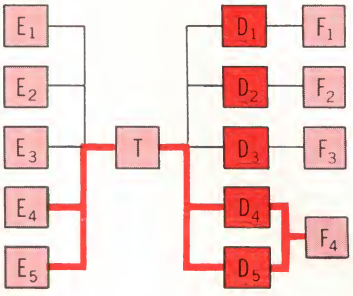


RD10
frequency sensing resonant reed relay

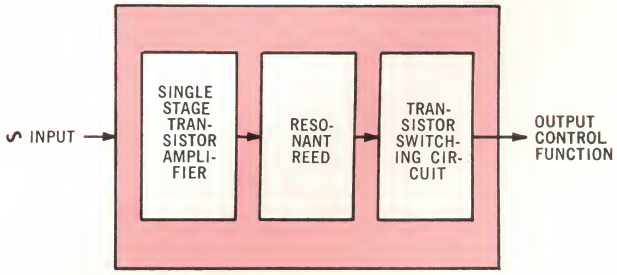
MD1C
resonant reed decoder module

RD10	MD1C
67 to 300 cps	67 to 1600 cps
varies less than .002% per °C (25°C REF.)	varies less than .002% per °C (25°C REF.)
−40°C to +85°C	−40°C to +85°C
±1.0% minimum, ±2.0% maximum*	±.25% minimum at 1.5 VRMS ±2.5% maximum at 5 VRMS
3 VRMS	1.5 to 2 VRMS for linear bandwidth response 2 to 5 VRMS for constant bandwidth response
600 ohms dc ±10%	. . . . .
. . . . .	0.2 megohms minimum
.75 VRMS max., 1.5 VRMS min.*	0.1 VRMS maximum
10% min. at resonant freq., 3 VRMS	external load: 500 ohms minimum
100 ma peak at 12 vdc resistive load	50 ma maximum at 24 vdc
. . . . .	30 ma at 24 vdc + external load

sitivities to meet customer requirements.



MD1C FUNCTIONAL BLOCK DIAGRAM



dimensional data

base diagrams

FIG. A

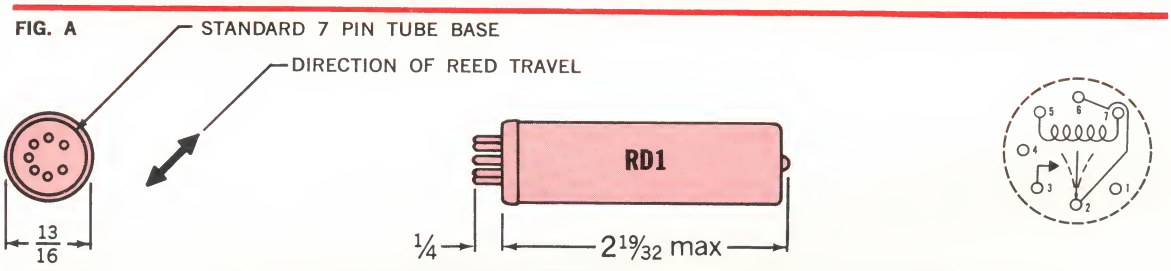


FIG. B

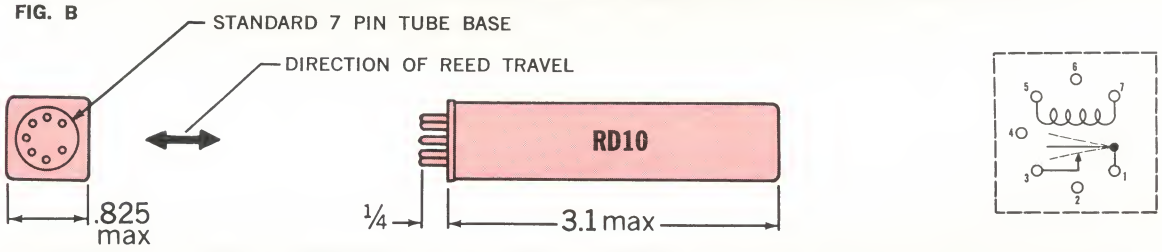
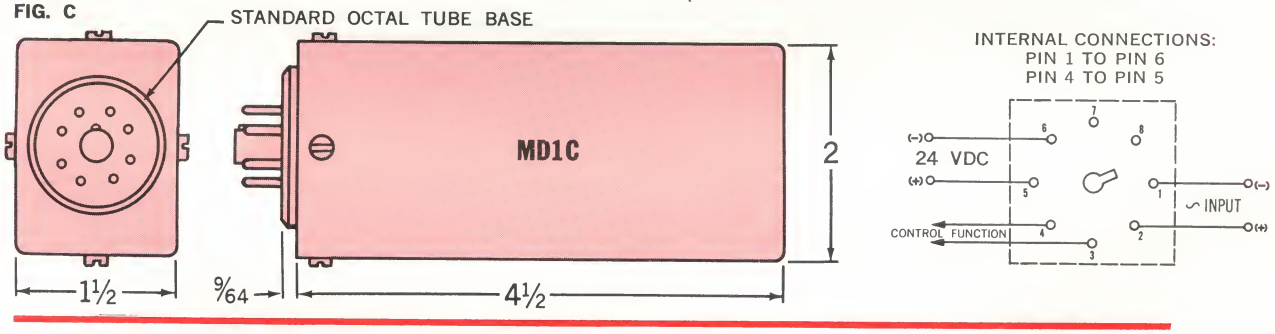


FIG. C



recommended decoder circuitry

The contacts of a resonant reed relay provide an intermittent closure, once each cycle. Continuous closure and heavier switching capacity is obtained by integrating a secondary relay, directly, or through a tube or transistor amplifier. Typical circuits for each method are illustrated in figures D, E, and F.

FIG. D. SECONDARY RELAY

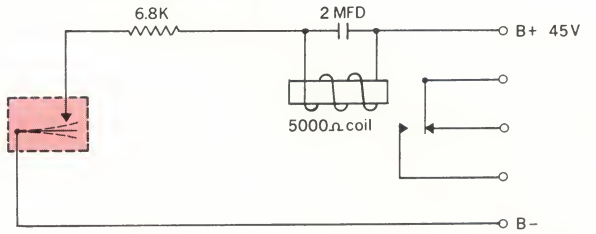


FIG. E. TUBE 6C4

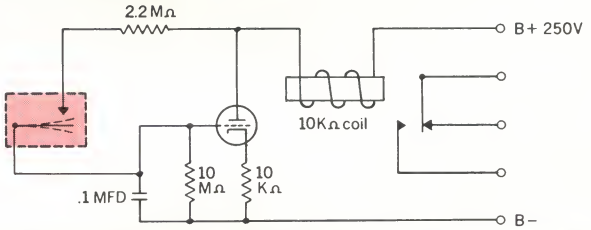


FIG. G. 2-TONE SIMULTANEOUS DECODER CIRCUIT

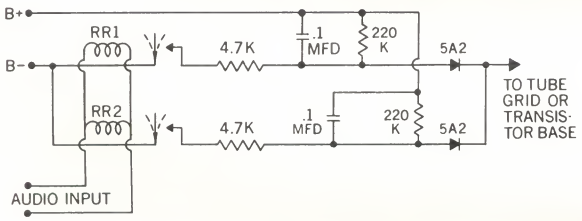


FIG. F. TRANSISTOR AMPLIFIER

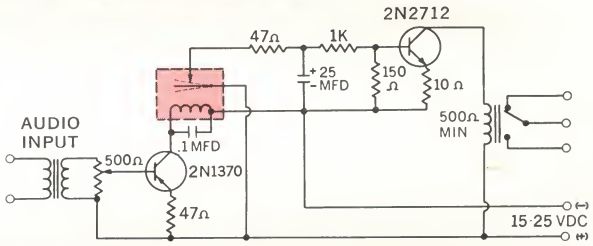
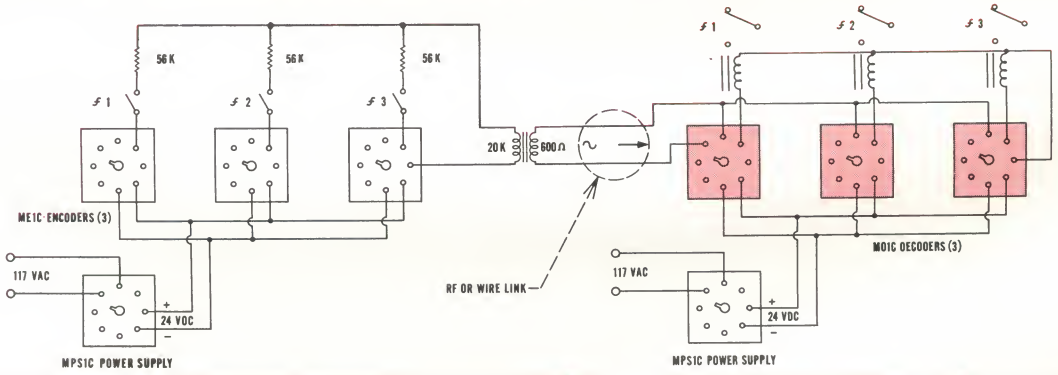


FIG. H. TYPICAL ENCODER-DECODER MODULE WIRING DIAGRAM



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